

cially full and useful; often cautionary statements are made to help the student over difficult spots. Figures 70 and 71 are almost theatrical in their instant impression, so strikingly do they portray the floral parts of *Orchis maculata*. It is unfortunate, however, that apparently all the figures lack an indication of the amount of enlargement.

Another feature of the book is the uniform treatment of the species selected for demonstration of floral mechanism. Thus the "habit, inflorescence, flower, calyx, corolla, androecium, gynoecium, pollination, and fruit" characters are given for each species treated.

The chart on page 151 suggests a phylogeny for the plant families treated in this book but such a suggestion is misleading both for the enormous gaps in the series chosen of the total plant families, indicating positions as it does for not one-thirteenth of the world's families, and even for the arrangement of the twenty-one families placed on the chart. Thus it is implied that the Caryophyllaceae are more "advanced" than the Violaceae, a fact ill supported by the morphology of these two families.

There is a one-page skeleton bibliography of sources well known to students of floral morphology, though there are omissions of such fundamental sources as the Coulter and Chamberlain volume hereinbefore mentioned. The three-page glossary is inadequate. Apomixis is too narrowly defined; cotyledon is scarcely defined at all. There is a good index.

Beyond the details mentioned in this review which detract from the book there remains a useful text which will ably serve as a handbook for use in courses in angiosperm morphology and systematics. It is hoped that the author will be able to rearrange the materials, with some elimination of extraneous topics, in an extended future edition that will save for us all the fine features of the present book. Meanwhile, its usefulness will prove its greatest compliment.

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### Methods and Materials for Teaching Science\*

RALPH C. BENEDICT

Throughout the centuries, since men have tried to approach the objective world in a spirit of pure enquiry, there have always been

\* Modern Methods and Materials for Teaching Science. Heiss, E. D., Osbourn, E. S., and Hoffman, C. W. Pp. 351. The Macmillan Co. \$2.50. 1940.

those who have sought, not only to follow the road of research themselves, but also to incite others to use similar methods; to approach the unknown in an unprejudiced, open-minded manner. Formerly, such teachers were lone individuals who might leave behind a few disciples to carry on their teaching tradition. Within the last few decades, however, during which the numbers of students in science classes has multiplied thousands of percent, there has come an increasing recognition of the potential value of science teaching as a possible medium for training in habits of thought and in attitudes of mind. To some extent, this trend has been marked by a deal of visionary and wishful thinking; the differences between what would be ideal and what might be practical and possible has been overlooked; wagons have been hitched to stars without any means of traction. Gradually, however, common sense has begun to catch up with inspiration, and pedagogical literature today includes an increasing number of pages of discriminating analysis and stimulating, useful suggestion.

The Heiss, Osbourn, and Hoffman text, "Modern methods and materials for teaching science," definitely belongs in this class. With the declared purposes (1) "to be a textbook for those courses in the methods of teaching science which are now being given in many colleges and universities; (2) to be a source book of information for those teachers of science, at whatever level they may be working, who wish to keep up with modern trends in the teaching of science," this should prove a useful introduction to the subject as it stands at present. For the experienced biology teacher, its chief value will be found in the introductory part in which the writers explore the general principles of science education; the detailed suggestions of the other parts can necessarily be only sketchy so far as any single science is concerned, but the bibliography at the back of the book can furnish plenty of additional sources relating to specific sciences.

The text is presented in three sections as follows: (1) Principles of science teaching; (2) Materials and devices for teaching science; (3) Sources of materials for teaching science.

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